**ATTACHMENT 4**

Preliminary 404(b)(1) Alternatives Analysis – California High-Speed Train Merced to Fresno Section

DRAFT Alternative Analysis Data: Alignment Alternatives

| Alignment Components[a] | Decision Rule #1 Consistency with Project Purpose | Decision Rule #2 Logistics and Technology | Decision Rule #3 Impacts to Aquatic Resources | | | | | | Decision Rule #4 Environmental Effects | | | | | | | | Decision Rule #5 Agency, Stakeholder and Public Positions | Decision Rule #6 Benefits of Alternative |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | Agricultural | | | | |
| | | | Streams, Creeks, Canals (linear feet)[b] | Number of Crossings[c] | Lakes/Ponds/ Swamps/ Reservoir (acres) | Wetlands (acres)d | Vernal Pools (acres)[d] | Special Status Plant/ Wildlife Habitat (acres)[e] | National Wildlife Refuge (acres) | Residential Displacement (acres)[f] | Commercial/ Industrial Displacement (acres)[g] | Cultural Resources[h] (parcels) | Parkland (number of parks)[i] | Agricultural Lands – Total including Prime (acres)[j] | Spilt Parcel Count | Split Parcel Acreage | | |
| **North-South Alignment (including station locations)** | | | | | | | | | | | | | | | | | | |
| A1 – BNSF with South SR152 Wye and DO2 - Mission (2003 Preferred Alternative) | This alignment alternative is consistent with the project purpose:<br>Provides a direct link between Merced and Fresno<br>Uses of existing rail corridor but must deviate to maintain speed design criteria | This alignment alternative is practicable because it can be constructed with existing technology and engineering practices.<br>Longest Alignment, longest travel time, highest cost.<br>There is low agency support for this alternative and low community support. | 5,050 | 22 | 0 | 10 | 3 | 298 | 0 | 83 | 20 | 41 | 0 | 779 | 83 | 7,578 (N-S 5,456 N-Wye: 2,122) | Low support from Le Grand, Planada, and Merced.<br>Support from Madera and Madera County, and Fresno.<br>Chowchilla supports this alternative and this wye over the Ave 24 Wye. | The BNSF is cooperative in considering sharing right-of-way. The alignment is able to be adjacent to the BNSF or other transportation corridors for approximately 75% of the alignment. |
| A1 – BNSF with Ave 24 Wye and DO2 - Mission | | | 7,040 | 22 | 0 | 10 | 3 | 260 | 0 | 70 | 28 | 42 | 0 | 732 | 94 | 10,314 (N-S: 5,456, Wye 4,858) | Low support from Le Grand, Planada, and Merced and Chowchilla (due to Ave 24 Wye). | Same as above. |
| A2 – UPRR with South SR152 Wye (2006 Preferred Alternative) | This alignment alternative is consistent with the project purpose:<br>Provides a direct link between Merced and Fresno<br>Maximizes the use of existing rail corridor. | This alignment alternative is practicable because it can be constructed with existing technology and engineering practices, however several UPRR and SR99 Crossings may result in costly constructability issues.<br>It is the most direct alternative between Merced and Fresno – shortest distance, but nearly 25% higher cost than A3.<br>There is considerable environmental agency support for this alternative.<br>Agricultural Community supports it.<br>Merced and Fresno Cities and Merced, Madera, and Fresno County support it. | 5,200 | 23 | 0 | 9 | 0 | 126 | 0 | 36 | 37 | 64 | 0 | 565 | 29 | 1,396 (N-S 463, Wye 933) | Low support from Madera and Chowchilla.<br>Support from Merced, Merced County, and Fresno. | Straight, efficient travel time, located adjacent to the transportation corridor of SR 99 and UPRR. |
| A2 – UPRR with Ave 24 Wye | | | 5,900 | 23 | 0 | 9 | 0 | 131 | 0 | 36 | 31 | 53 | 0 | 503 | 44 | 3,342 (N-S: 463, Wye 933) | Same as above, except Merced area farmers oppose the Ave 24 Wye. | Same as above. |

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| | | | | | | | | | | | | | | Agricultural | | | | |
| | | | Streams, Creeks, Canals (linear feet)[b] | Number of Crossings[c] | Lakes/Ponds/ Swamps/ Reservoir (acres) | Wetlands (acres)d | Vernal Pools (acres)[d] | Special Status Plant/ Wildlife Habitat (acres)[e] | National Wildlife Refuge (acres) | Residential Displacement (acres)[f] | Commercial/ Industrial Displacement (acres)[g] | Cultural Resources[h] (parcels) | Parkland (number of parks)[i] | Agricultural Lands – Total including Prime (acres)[j] | Split Parcel Count | Split Parcel Acreage | | |
| A3 – Western Madera with South SR152 Wye<br>(Proposed During Scoping) | This alignment alternative is consistent with the project purpose to<br>Provides a direct link between Merced and Fresno<br>However it deviates to avoid Chowchilla and Madera impacting agricultural land, which is contrary to CHSRA's guiding principal | This alignment alternative is practicable because it can be constructed with existing technology and engineering practices.<br>This alternative provides the shortest, fastest route for connectivity between San Francisco and Los Angeles (via Pacheco Pass).<br>Some community/public opposition for this alternative.<br>Strong agricultural community opposing this alternative | 5,090 | 21 | 0 | 9 | 0 | 201 | 0 | 30 | 20 | 34 | 0 | 707 | 133 | 10,186<br>(N-S: 8,530, Wye: 1,656) | Strong opposition from all local and county jurisdictions. | Fastest travel time between the Bay Area and Los Angeles.<br>Avoided community impacts on Chowchilla and Madera. |
| A4 – UPRR/BNSF Crossover with Ave 24 Wye<br>(Proposed during Alternatives Analysis) | This alignment alternative is consistent with the project purpose:<br>Provides a direct link between Merced and Fresno<br>However it deviates to connect back and forth between UPRR and BNSF impacting agricultural land, which is contrary to CHSRA's guiding principal | This alignment alternative is practicable because it can be constructed with existing technology and engineering practices.<br>There is mixed public support for this alternative. | 6,280 | 21 | 0 | 12 | 2 | 169 | 0 | 52 | 22 | 44 | 0 | 594 | 72 | 11,275<br>(N-S: 2,805, Wye: 3,470) | Low support from Merced and Merced County.<br>Support from Chowchilla, City of Madera, and Madera County. | Avoided community impacts on Chowchilla and Madera. |
| Hybrid using Ave 24 Wye (No alternative Wye)<br>(Proposed during Alternatives Analysis) | This alignment alternative is consistent with the project purpose:<br>Provides a direct link between Merced and Fresno<br>Maximizes the use of existing alignment while avoiding community centers | This alignment alternative is practicable because it can be constructed with existing technology and engineering practices.<br>There is mixed public support for this alternative. | 5,320 | 28 | 0 | 10 | 0 | 70 | 0 | 58 | 26 | 40 | 3 | 789 | 80 | 8,856<br>(N-S: 8,166, Wye: 690) | Support from Merced and Madera.<br>No voiced opposition, except by farmers. | Avoids Chowchilla and Madera.<br>Shorter than BNSF Alternative, and less elevated guideway over UPRR/SR 99 – therefore, least costly alternative.<br>May result in less impact on many resources than other alternatives considered. |

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| | | | | | | | | | | | | | | Agricultural | | | | |
| | | | Streams, Creeks, Canals (linear feet)[b] | Number of Crossings[c] | Lakes/Ponds/ Swamps/ Reservoir (acres) | Wetlands (acres)d | Vernal Pools (acres)[d] | Special Status Plant/ Wildlife Habitat (acres)[e] | National Wildlife Refuge (acres) | Residential Displacement (acres)[f] | Commercial/ Industrial Displacement (acres)[g] | Cultural Resources[h] (parcels) | Parkland (number of parks)[i] | Agricultural Lands – Total including Prime (acres)[j] | Split Parcel Count | Split Parcel Acreage | | |
| **HMF** | | | | | | | | | | | | | | | | | | |
| Castle Commerce Center HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This alternative HMF site is practical because it can serve current and future phases of HST.<br>Land use is appropriately zoned and no sensitive receptors around the site.<br>There is strong local agency support for this alternative and low community support. | 1,000 | NA | 0 | 1 | 0 | 2 | 0 | 11 | 144 | 0 | 1 | 123 | N/A | N/A | Strong support from Merced, Merced County and Atwater. | Existing industrial facility, existing rail connectivity.<br>Close to infrastructure or some are present on property.<br>Accessible via Santa Fe Boulevard. |
| Mission Avenue HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This site is not practical due to the difficulty in providing access to the site from the north. The Mission Avenue site is approximately 3 miles south of the proposed Downtown Merced Station. Most of the distance along the HST alignment between the site and the station consists of a high-speed curve on a high aerial structure above SR 99. Design objectives require that yard turnouts be placed on straight sections of track. In this case, the nearest location for a yard turnout would be north of the Merced station. Therefore, the Mission Avenue site would require a north yard spur running at a high elevation through Downtown Merced. | 0 | NA | 0 | 0 | 0 | 0 | 0 | 8 | 27 | 0 | 0 | 171 | N/A | N/A | Strong support from Merced, Merced County. | Close to infrastructure or some are present nearby property.<br>Accessible by SR 99. |
| Harris-DeJager HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This alternative HMF site is practical because it can serve current and future phases of HST. It is positioned adjacent to the HST tracks for multiple alternatives (UPRR/SR 99 and the Hybrid).<br>Land use zoning is compatible and no sensitive receptors around the site.<br>There is strong local agency support for this alternative and low community support. | 380 | NA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 355 | N/A | N/A | Strong Support from Chowchilla and Madera County. | Open land, not encumbered, no relocations. |

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| Harris-Kwan HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This site alternative is not practical, because it is longer on alignment alternatives that are still under consideration. As a result, it would require spur tracks exceeding 5 miles in length for access. The additional 5 miles of spur track would have other environmental or farmland impacts (not included in impact calculations presented). | 11,150 | NA | 0 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,511 | N/A | N/A | Strong support from Chowchilla and Madera County. | Open land, not encumbered, no relocations. |
| Kojima Development HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This alternative HMF site is practical because it can serve current and future phases of HST. It is positioned adjacent to the HST tracks for the BNSF alternative.<br>Land use zoning is compatible and no sensitive receptors around the site.<br>There is strong local agency support for this alternative and low community support. | 300 | NA | 0 | 3 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 351 | N/A | N/A | Support by Madera County. | Accessible via Santa Fe Boulevard.<br>Open land, not encumbered, no relocations. |
| Fagundes HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This alternative HMF site is practical because it can serve current and future phases of HST. It is positioned adjacent to the HST tracks for multiple alternatives.<br>Land use zoning is compatible and no sensitive receptors around the site, but it may require relocating a dairy.<br>There is strong local agency support for this alternative and low community support. | 500 | NA | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 197 | N/A | N/A | Strong support from Chowchilla and Madera County. | Accessible by SR 152. |
| Harris HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This site alternative is not practical, because it is longer on alignment alternatives that are still under consideration. As a result, it would require spur tracks exceeding 5 miles in length for access. The additional 5 miles of spur track would have other environmental or farmland impacts (not included in impact calculations presented). | 0 | NA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 242 | N/A | N/A | Strong support from Chowchilla and Madera County. | Open land, not encumbered, no relocations. |

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| Gordon-Shaw HMF | This HMF site alternative is consistent with the Project Purpose, because an HMF site is necessary to operate the system. | This alternative HMF site is practical because it can serve current and future phases of HST. It is positioned adjacent to the HST tracks for the UPRR/SR 99 alternative.<br>Land use zoning is compatible and no sensitive receptors around the site.<br>There is strong local agency support for this alternative and low community support. | 3,400 | NA | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 320 | N/A | N/A | Strong support from Chowchilla and Madera County. | Close to infrastructure or some are present nearby property, Accessible by SR 99.<br>Open land, not encumbered, no relocations. |

[a] Comparison of north-south alternatives with best-performing design options and wye connections.
[b] Estimations determined using aerial photographs. Linear feet of waterways for north-south alignments measured by length of bridge crossings. For HMFs the number of crossings cannot be determined at the AA level of analysis. Therefore, number of crossings are not presented and linear feet of waterways for HMFs includes the total length of streams/creeks/canals within the HMF boundaries, assuming worst-case scenario, rather than length of bridge crossings as presented for alternatives.
[c] Number of crossings determined using aerial photographs.
[d] U.S. Fish and Wildlife Service, National Wetland Inventory, obtained January 2009. Combined with field surveys from May 2009. Estimates of wetlands and vernal pools always rounded up.
[e] California Department of Fish and Game, California Natural Diversity Database, August 2009.
[f] Data obtained: Merced County, April 2009; Madera County, April 2009; and Fresno County, May 2009.
[g] Data obtained: Merced County, April 2009; Madera County, April 2009; and Fresno County, May 2009.
[h] CHRIS, May 2009.
[i] Data obtained: City of Merced, February 2009; Merced County, November 2008; Madera County, April 2009; and City of Fresno, September 2003.
[j] Data obtained: Merced County, April 2009; Madera County, April 2009; and Fresno County, May 2009. Estimate of total includes prime farmlands. Because agricultural land usually consists of large parcels, the acquisition of part of a property results in the severance (disconnection) of land retained under agricultural use, as well as impacts associated with construction and occupation or use of developed areas.
NA=Not Available at the AA level of analysis

**Table 2**
Preliminary 404(b)(1) Alternatives Analysis – California High-Speed Train Merced to Fresno Section
DRAFT Alternative Analysis Data: Station Locations

| Evaluation Category | Evaluation Criteria | Castle Commerce Center | Downtown Merced | Amtrak |
|---|---|---|---|---|
| Design Objectives | Intermodal connections | Neutral<br>Several Merced County Transit (The Bus) routes serve site, also multiuse regional path is near site. | Supportive<br>"Merced Transpo" is central hub for Merced County Transit (The Bus), also major regional and intercity bus hub. | Supportive<br>Transit hub served by multiple Merced County Transit (The Bus) routes, depot for Amtrak intercity rail service. |
| Land Use | Potential for TOD | Neutral<br>Atwater and Castle Commerce Center current plans support moderate commercial but only limited high-density residential in station area. | Supportive<br>Planning and zoning in station area supportive of substantial TOD, proximity of downtown commercial zone is additional benefit. | Not supportive<br>Area around station primarily zoned low-density residential, and no changes proposed in future plans. |
| | Consistency with other planning efforts | Neutral<br>Although Atwater and Castle Commerce Center current plans support commercial and residential in station area, City of Merced prefers downtown Merced site. | Supportive<br>City of Merced favor station at Downtown Intermodal Center, areas around station are designated economic development zones. | Not supportive<br>City of Merced is opposed to station along BNSF corridor in downtown. |
| Disruption to Communities | Local traffic effects around stations (number of roads with decreased levels of service). | 10 links analyzed; 1 link (10% of total links) changes from LOS B to C. | 12 links analyzed; 2 links change from LOS B to C, 1 link changes from LOS C to D (25% of total links affected). | 14 links analyzed; 4 links change from LOS B to C, 1 link changes from LOS C to D (35% of total links affected) . |